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(6) A STUDY TO DETERMINE THE OPTIMAL FREQUENCY FOR CONDUCTING PERIODIC DENTAL EXAMINATIONS

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by

(10) COL Warren A. Parker, DC, US Army
COL Richard V. Mayotte, DC, US Army
CPT Terry Rauch, MSC, US Army

Health Care Studies Division
Academy of Health Sciences
Fort Sam Houston, TX 78234

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

A mandatory annual dental examination is the most important element in the Army's Oral Health Maintenance Program. The annual requirement is based upon the premise that most individuals accrue sufficient dental problems during that interval to make dental treatment necessary. The objective of this study was to determine if there is a significant link between the volume and type of dental care needs and the time interval between routine periodic (non-emergency) dental examination.

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Data for the survey were collected at 10 Army installations of varying sizes and missions. The Army Oral Health Maintenance Program was the sample selection mechanism. Information was extracted from the dental records of 520 Army members of varying ages and ranks. Care needs were determined in the areas of restorations, extractions, endodontics, fixed prosthodontics, removable prosthodontics, periodontics, and prophylaxis. The data showed that in the important areas of restorative and periodontal treatment requirements there was an increased need as the interval lengthened since the last completed care sequence. The data also showed a decrease in restorative needs as a function of increased age while removable prosthodontics and periodontal care needs increased as age increased.

SUMMARY

This study was requested by the Assistant Surgeon General for Dental Services, Office of The Surgeon General, in Summer 1979. The Health Care Studies Division (HCSD), Academy of Health Sciences, US Army (AHS), was tasked to perform the study by the Commander, Health Services Command (HSC). The purpose of the study was to determine the optimum interval that should occur between mandatory periodic dental examinations for active duty Army personnel.

The objectives of the study were to: (1) identify Army members who had all of their dental care needs satisfied in one year, two years or less, and more than two years prior to a records survey, and who had received no definitive dental care subsequent to that time; (2) to determine the treatment needs of these individuals; and (3) to determine if there is a significant link between the volume and type of dental care needs and the time interval between routine periodic (non-emergency) dental examinations. Data for the survey were collected at 10 Army installations. The Army Oral Health Maintenance Program was the sample selection mechanism.

This portion of the study included information extracted from the dental records of 520 Army members of varying ages and ranks. These persons were selected by the project officers according to strict pre-set criteria. When they reported for their annual dental examination their dental treatment needs were determined by the dentist who performed the examination.

Care needs in areas of restorative, fixed prosthodontics, removable prosthodontics, extractions, preventive, and periodontics were determined. Distributions of these care needs by interval group (time since last completed care sequence), age group and rank are provided for the entire sample. Analysis of variance, Chi-square, Pearson R, and the Student-Newman-Keuls (SNK) were used in analysis of the data.

The data showed that in the important areas of restorative care and periodontal treatment requirements there was an increased need as the interval lengthened since the last completed care sequence. The data also showed a decrease in restorative needs with age while removable prosthodontics and periodontal care needs increased as age increased. The study also showed that there were no significant differences in care needs among the various rank groups.

ACKNOWLEDGEMENTS

The authors wish to thank the participating Dental Activity Commanders and their staffs who were instrumental in collecting the data for this study. Their interest was vital to the successful completion of the study effort. The authors are also indebted to the Health Care Studies Division personnel who expended considerable time and effort in the preparation of the figures and tables, and in the typing of the manuscript.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (Contd)

I. INTRODUCTION.

A. Purpose.

The primary purpose of this study was to evaluate the dental care needs of persons who had not received definitive dental care for specified but varied periods of time and from that information to determine if there might be an optimum time interval between mandatory dental examinations for Army personnel.

B. Background.

Army personnel are required to receive a complete dental examination annually. The purpose of this requirement is primarily to detect dental disease early and to treat it with minimal loss of duty time for the patient and with minimal impact on scarce dental resources. All Army members must be examined yearly, regardless of age or rank. This program requires many resources including personnel, equipment, (including clinic space), manhours for both professional and paraprofessional personnel, and money.

The annual dental examination is the cornerstone of the Army's Oral Health Maintenance Program (AOHMP). The AOHMP is in essence an incremental care program wherein the ultimate goal is to attain a state where all major care needs are taken care of for Army personnel. Early detection and treatment of dental disease is essential to maintain an effective and viable incremental dental care program. Such programs can reduce the time, financial, and manpower cost needed to deliver dental care to defined, discrete populations.[1,2,3] The AOHMP presently uses the required annual dental examination as the major vehicle by which patients enter into the incremental care system. Unpublished data from studies performed by the Health Care Studies Division, US Army Academy of Health Sciences, indicate that annual recurring (incremental) dental care needs are high.[4] Definitive data about an optimal dental examination frequency is not available.

II. OBJECTIVES.

A. To identify Army members who had all of their dental care needs satisfied, as attested to by their dental records, one year or less, two years or less, and more than two years prior to a records survey, and who had received no definitive dental care subsequent to that time (an examination would not disqualify).

B. To determine the treatment needs of each interval group. The cumulative need for restorations, extractions, endodontics, fixed prosthodontics, removable prosthodontics, periodontics, and hygiene will be used as an index of oral health.

C. To determine if there is a significant link between dental care needs and the time interval between routine periodic (non-emergency) dental examinations.

III. METHODOLOGY.

A. Overview.

The data were obtained from records of persons scheduled to receive an annual dental examination during a specific month. These records were selected by the investigators during site visits to the selected Army installations. Criteria for selecting the subjects are listed in paragraph IIA above. All persons fitting the criteria were selected without exception. At the time of their annual dental examination the dental care needs were recorded by the examining dentist using the form provided, (Appendix A). Due to various reasons such as transfers, separations, and just no-shows, all of the patients selected could not be evaluated. Data was gathered from all available records and was analyzed at HCSD. Determinations were made of interval since last completed care sequence, rank, age, sex, and the amount of dental care required according to these several discriminants. Types of dental care required were obtained in numbers of teeth or units required and by percent of the sample requiring the specific types of care.

B. Sample.

The sample population consisted entirely of active duty Army personnel stationed within the continental United States. Ten dental activities (DENTACs) were involved in data collection in order to obtain a representative sample of the Army population. Factors such as installation size, mission, and duty assignments of soldiers were considered in the site selection process. Seven rank groups were identified as one subpopulation factor for comparison and data analysis. They are:

Group 1 - E1-E3
Group 2 - E4-E6
Group 3 - E7-E9
Group 4 - W1-W4
Group 5 - O1-O3
Group 6 - O4
Group 7 - O5-O6

The sample population was also grouped by age.

The Army Oral Health Maintenance Program (AOHMP) was the mechanism used to select the initial pool of subjects for the survey. By collecting data for this study at the time of the individuals' required annual dental examination, inconvenience for both the examiners and subjects was minimized, the need for additional dental resources was eliminated, and there was no disruption in the normal scheduling of dental care in the clinics.

C. Data Collection Procedures.

The dental records of individuals scheduled to report for an annual dental examination during a specific month were examined to identify those meeting the criteria in IIA above. The records selected were tagged

and forms for the survey inserted into the record jacket for use at the examination appointment. Section I and the first elements of Section II of the Dental Care Requirements Data Form were completed at this time. A copy of the data collection instrument and instructions to the examiner are at Appendix A. The data collection form contained 17 dental care related entries and demographic and administrative data.

Examiners recorded the numbers of restorations, units of crown and bridge, complete and partial dentures, extractions, and teeth needing endodontic therapy. Also recorded was the need for dental prophylaxis and periodontal scaling and the type of radiographs needed (if any).

Data Handling. The data collection forms were reviewed for completeness and correctness by the Project Officer at HCSD prior to keypunching. Incomplete or inaccurate data collection forms did not present a significant problem.

IV. FINDINGS.

A. Sample Characteristics.

A total of 520 examinations comprise the data base for this report; this constitutes a return of less than 50% of the records tagged. The distribution of the sample by interval group is shown in Figure 1. The distribution of the sample by rank group is shown in Figure 2. The proportion of officers is larger than in the Army at large. This may reflect the fact that in general officers are more able to get away for such administrative requirements, place oral health higher on their value scale, or it may just have happened by chance. Commissioned officers comprise about nine percent of total Army strength. The distribution of the sample by age group is shown in Figure 3. The mean age was found to be 29.69 years, which is slightly higher than the mean age of the soldier in the contemporary Army.

B. Distribution Characteristics.

The distribution of the variables for the number required are all positively skewed and have a mode of zero. Exceptions to this are the categories of dental prophylaxis, calculus removal, and periodontal care, where needs were quantified only in terms of the need for care or lack thereof. The mode for prophylaxis and calculus removal was "yes" and for periodontal care the modal response was "no."

Percentage distributions and cumulative percentages provide meaningful statistics for the number of treatments required and/or the number of persons requiring a particular type of care.

The mean, in skewed distributions as described, is most useful for the application of time and cost-related measures.

The distribution percentages completely described the population in terms of practical significance. The use of mean values to which time data are applied is an appropriate means by which to estimate manhours needed to deliver care to the specific population subgroup described.

C. Reliability of Data.

Data reliability was determined by using, where appropriate, the standard error of the mean to calculate the 95% confidence intervals for the variable for ± 2 standard errors). Table 5A shows the 95% confidence intervals for the number of restorations required by the three interval groups (time since last completed care sequence). These confidence intervals establish ranges within which the means of subsequent samples from similar populations are expected to fall 95% of the time.

D. Demographic Analysis.

The data on dental care needs was organized in care tabulation tables. These tables illustrate the distribution of cases in relation to two or more variables, e.g., the distribution of persons requiring or not requiring periodontal care by age group. The joint frequency distributions were analyzed by the chi-square statistic (X^2) to determine if the variables were statistically independent. The Pearson product-moment correlation was used to measure the strength of the relationship between two variables. Significance tests for correlation coefficients were derived from the use of the Students-t test using N-2 degrees of freedom.

The chi-square statistic computes the cell frequencies which would be expected if no relationship existed between variables at given row and column totals. These expected frequencies are then compared to the actual values found in the table. The chi-square value increases as the difference between the expected and actual value increases. A chi-square value that is significant implies that a systematic relationship exists between variables, but it does not indicate the strength of the relationship. To do this, Pearson's R (correlation) was used to indicate the degree to which variation (i.e., change) in one variable was related to variation in the other.

Analysis of variance was used, where appropriate, to test for significant differences between means. However, due to large differences between group sizes and the relatively small number of persons needing treatment, mean values were used to determine time factors and chi-square was used to determine whether the variables are independent or related.

When significant differences were found between levels of the independent variable, i.e., interval groups, age groups, or rank groups with Analysis of variance, the Student-Newman, Keuls (SNK) test was used. SNK compares all possible pairs of group means to determine which groups differ significantly. It is an appropriate posteriori contrast test when groups are of unequal size.

E. The Study Sample Demography.

Demographic characteristics for the sample are depicted in Tables 1 and 2 and Figures 1 to 3. The distribution by rank group indicate that 37% of the sample are within the E1-E4 group, 31% within the E5-E6 group, and 12% within the E7-E9 group. Overall, enlisted personnel comprised approximately 80% of the sample population. Officer groups accounted for the remaining 20%. It is evident from the data in Table 1 that there is a significant relationship between rank and interval groups, X^2 (12) 35.24, $p < .001$. However, the relationship reflects the relatively small sample size of the W1-W4 group (n=14) in contrast to the other rank groups.

The mean age (29.69 years) and standard deviation (7.43) for the entire sample is shown in Table 2. A comparison of mean age values between interval groups failed to reach significance.

F. Dental Care Needs by Interval Group.

The percent of the sample requiring dental care for each interval group is shown in Table 3. Interval Group 1 includes those persons whose last completed care sequence occurred 12 months or less prior to the examination. Interval Group 2 includes those from 13-24 months, and Group 3 includes those of 25 months or more. Approximately 51% of the entire sample were in need of some type of restorative care. The need for restorative care increased progressively with time, $R = .13$, $p < .001$, as illustrated in Tables 3 and 4 and Figure 4. Forty-seven percent of Group 1 required restorative care; 54% of Group 2 and 64% of Group 3. Moreover, there was a significant difference in the mean number of restorations required as a function of time (interval group) $F(2,524) = 4.71$, $p < .009$ (see Table 5A). To determine the nature of the difference between groups, a Student-Newman-Keuls (SNK) test for posteriori contrasts was performed on pairs of group means. The results are deputed in Table 5B and indicate that Interval Groups 1 and 2 have a significantly lower mean number of restorations required than Group 3. On the other hand, there was no significant difference in mean values between Interval Groups 1 and 2. Standard errors and 95% confidence intervals (CI) are depicted in Table 5A. The relatively large CI for Group 3 (1.41 to 3.19) is due to the larger standard error, indicating a greater degree of discrepancy between the sample mean and the unknown population mean. Yet it is clear that the need for restorative care increases as a function of the length of time since all dental care was last completed.

Overall, seven percent of the population required fixed prosthodontics. The requirement does not reflect a linear trend with interval time since six percent of the sample in Group 1 needed treatment, 11% in Group 2 and only five percent in Group 3. There was no significant difference in the distribution of the need for fixed prosthodontics as a function of interval groups (Table 6). Removable prosthodontics were required by approximately seven percent of the sample. In addition, there was a progressive need for this treatment as the interval increased. Three percent of Group 1 required care, seven percent of Group 2 and 12 percent of Group 3. Moreover, there was a significant difference between interval groups for the distribution of removable prosthodontics required, $X2$ (4) = 15.16, $p < .004$ (see Table 7 and Figure 5).

The mode for the number of teeth requiring extraction was zero. No extractions were needed by 92 percent, and nearly 99 percent of the sample required two or less extractions. Table 8 illustrates that the distribution of the number of teeth requiring extraction was not significantly different between interval groups.

Endodontic care need was evidenced in two percent of the entire sample. Two percent required care in Group 1, one percent in Group 2 and three percent in Group 3. The results of the chi-square test failed to detect a significant difference in the distribution of the number of teeth requiring endodontic treatment as a function of the interval group (Table 9).

Oral prophylaxis was needed by 91% of the patients (Table 10). Care was required by 92% of those examined in Group 1, 91% in Group 2, and 85% in Group 3. Table 11 shows that calculus removal was needed by 66% of the entire population. Sixty-seven percent of Group 1, 66% of Group 2 and 63% of Group 3 required treatment. Chi-square tests revealed no significant difference in the distribution of patients requiring oral prophylaxis or calculus removal as a function of the interval since all previous dental care was completed.

Periodontal care was required by eight percent of the sample (Table 12). The need for treatment increased progressively as the interval increased with seven percent of Group 1, eight percent of Group 2 and 14% of Group 3 needing care (see Figure 6). However, an analysis of the distribution by chi-square failed to achieve significance.

G. Dental Care Needs by Age Groups.

Tables 13 through 20 illustrate specific dental care needs as a function of the age group. No significant difference was reported for restorative care, yet there was a significant correlation indicating that as patient age increased there was a lesser restorative care need, $R = .11$, $p < .007$ (Table 13 and Figure 7). The overall mean number of restorations required was 1.48 for the entire sample.

There was no significant difference found in the distribution of fixed prosthodontics by age group. However, the distribution for required removable prosthodontics differed significantly as a function of age group, $X^2 (4) = 10.11$, $p < .038$, with the care need increasing as the age group increased $R = .08$, $p < .021$ (Table 15 and Figure 8).

The number of teeth requiring extraction did not differ significantly between age groups, but, a linear trend emerged that as the patient age group increased there was a decreased need for extractions, $R = .12$, $p < .002$ (Table 16 and Figure 9). There was no significant difference found in the distribution of teeth requiring endodontic care or in patients requiring dental prophylaxis by age group (Table 17 and 18). The need for calculus removal did not differ significantly between age groups, yet there was a significant correlation indicating that the need for calculus removal decreased

as the patient's age increased, $R = .08$, $p < .029$ (Table 19 and Figure 10). Table 20 shows that the distribution of the need for periodontal treatment differed significantly by age group, X^2 (2) = 18.00, $p < .0001$. Furthermore, the correlation coefficient ($R = .16$, $p < .0001$) indicates a greater need for periodontal treatment as the patient age group increased (Figure 11).

H. Dental Care Needs by Rank Groups.

Specific requirements for dental care needs are shown in Table 21 through 28. There were no significant differences found in the distribution of care needs by rank group except for the requirement of calculus removal. Clearly, the officer ranks exhibit a lesser need than the enlisted groups, X^2 (6) = 23.11, $p < .0008$, yet these findings must be interpreted cautiously in light of the small sample for officer groups (Table 27 and Figure 12). This difference between rank groups is supported by findings from previous studies.[4,5]

V. DISCUSSION.

A. The Sample Population.

The overall sample size (n=525) is a sufficiently large base on which to make statistically valid inferences. However, the nature of the study effort required that this sample be divided into rank groups, age groups, and interval since last completed care sequence. By so doing the sample was somewhat diluted, although in most cases, the sample sizes were larger than traditionally acceptable minimums. The only exception was the officer group where there were 18 and 14 individuals respectively in the two higher rank groups, and 14 individuals in the warrant officer groups.

The basis for selecting the sample was to inspect the dental record of every individual slated to receive an annual dental examination during a specific month. No attempt was made to select individuals by sex, rank, age, or any other limiting demographic variable because it was felt that the selection mechanism would provide a representative sample. The study data was analyzed by subgroups merely to allow discussion of the data in a more detailed manner and to see if either age or rank had an effect. The most important demographic variable was the interval since the last completed care sequence. If this factor played a significant part in the incidence of dental care needs, the age and rank factors would only be of academic interest.

B. Dental Care Needs by Interval Group.

The data clearly showed that as the interval between treatment sequences increased the need for restorative care also increased. This finding was not unexpected. The study did not attempt to determine if the greater need was due to new caries or to a larger number of defective restorations. But the important factor was that the mean need did go up. The significance of this finding is that restorative care comprises the largest single category of care needs. A relatively small increase in the mean need can translate into a much larger actual workload. An important aspect of the analysis is the fact that Group 3 was statistically significantly different from Group 1 and 2. This suggests that although a large proportion of each group required

restorative care, a significant increase was detected only for the group in which the interval time exceeded 24 months. The need for removable prosthodontic care also increased as a function of time whereas the fixed prosthodontic category did not increase.

There was an apparent contradiction in the area of preventive care and periodontal therapy needed. The requirement for prophylaxis and calculus removal did not show a significant change as the time interval increased. The need for periodontal care increased and the explanation is rather simple. Traditionally, dentists recommend that patients have a dental prophylaxis at least annually. Therefore, it did not matter whether a patient had not received dental care for one, two, three years or more. A prophylaxis and/or scaling would still be recommended. However, the interval since the last completed care sequence would be expected to significantly affect the oral health of many people. Since the gingival tissues are especially susceptible to plaque and calculus buildup the longer intervals without professional preventive care might be expected to result in an increased incidence of periodontal disease. Although the difference between groups was not statisically significant there was a strong correlation between required periodontal care and interval length. The magnitude of the increases, although not statisically significant, may reflect practical or clinical significance.

C. Dental Care Needs by Age Group.

There were some interesting findings which serve to reinforce the data relating to dental care needs by interval since the last care sequence. Although there were no statistically significant differences in restorative care needs for the three age groups, the data did show a significant correlation between age and a decreasing restorative need. As age increased the need decreased. But tempering this favorable finding there are two other findings which showed that there were increasing removable prosthodontics and periodontal care needs as age increased. The significance of these latter findings, of course, is that there appears to be a greater threat to a patient's oral health as age increases. This increasing risk may require more frequent dental attention to prevent the occurrence of active dental disease.

D. Dental Care Needs by Rank Groups.

Except for the finding that the officer groups had a lesser need for calculus removal than the other rank groups, there were no significant differences in dental care requirements among the rank groups. The lesser need for calculus removal is not an intuitive finding and should be taken with caution. The sample size was quite small in comparison to the other groups and based upon other care need studies a larger sample size would show that needs in this area would more closely parallel other populations.

VI. CONCLUSIONS.

A. The proportion of the sample requiring restorative care and calculus removal/oral prophylaxis on an annual increment is extremely high and is considered to be of practical clinical significance.

B. Although the need for restorative care was high among all interval groups, a statistically significant difference was demonstrated only between Interval Group 3 and the lesser interval groups. The need for removable prosthodontics increased as a function of time and the differences between interval groups were statistically significantly different.

C. Differences between interval groups were not significantly different for other types of dental care.

D. There was a positive linear correlation between the need for periodontal care and interval groups which may be of practical significance to clinicians.

E. The need for removable prosthodontics and periodontal care increased as age increased. The need for restorative care decreased as a function of age. There does not appear to be an age-related overall decrease in the need for dental care.

F. There were no significant differences in care needs among the various rank groups.

G. Use of the AOHMP mechanism as a source of patients for the study was the probable cause for an imbalance of age and rank groups.

H. In general, optimal levels of oral health maintenance require, at least, an annual examination.

VII. RECOMMENDATIONS.

A. An annual recall examination for all age groups should be continued in order to optimize maintenance of the current level of oral health in the Army.

B. The results of this study should be made available to planners at the OTSG level.

C. Any future studies of this type should be designed to provide for less restricted access to participants than can be provided by the AOHMP mechanism.

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FIGURES

FIGURE 1

DISTRIBUTION OF SAMPLE POPULATION BY INTERVAL GROUP

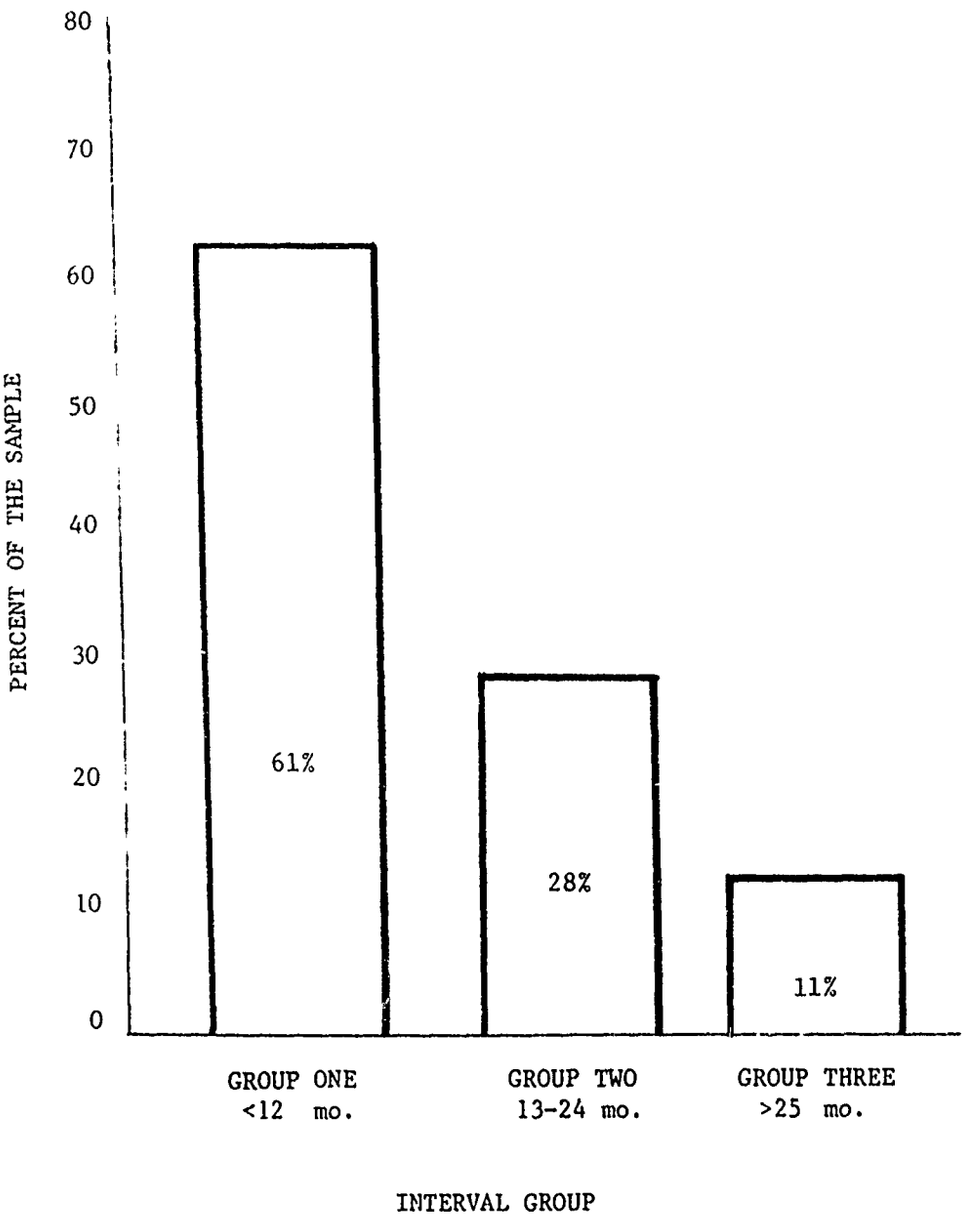


FIGURE 2

DISTRIBUTION OF SAMPLE POPULATION
BY RANK GROUP

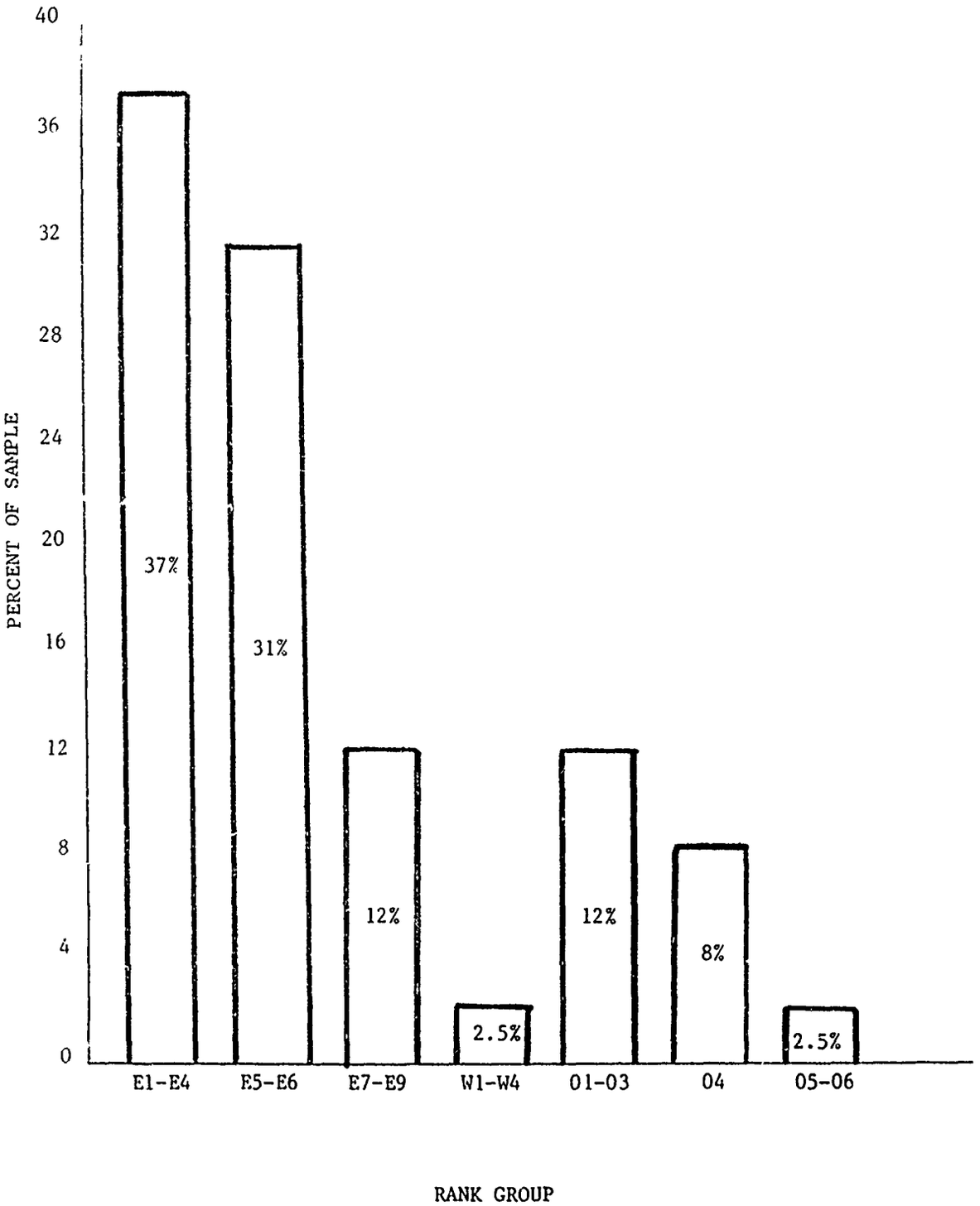


FIGURE 3

DISTRIBUTION OF SAMPLE POPULATION BY AGE GROUP

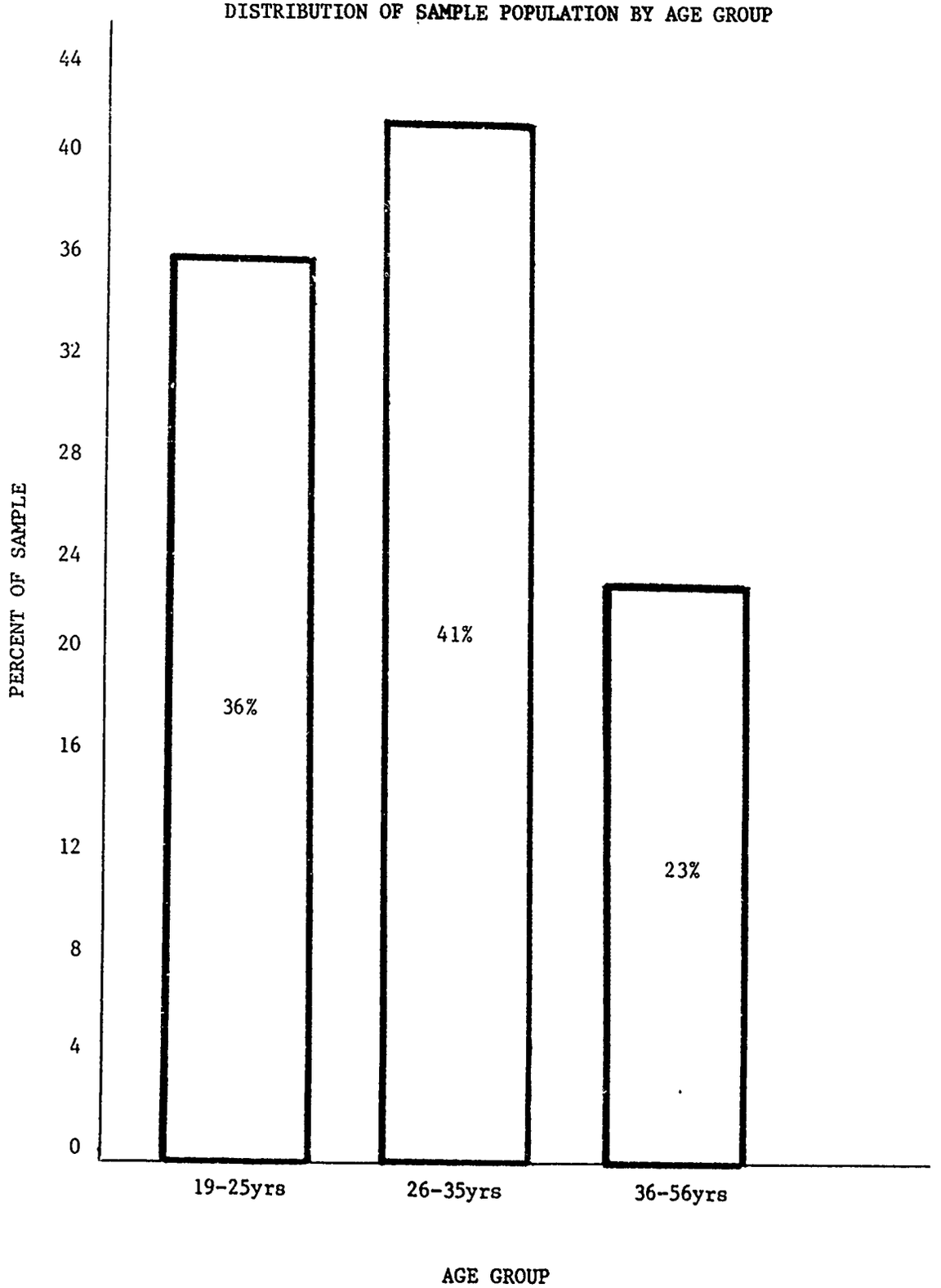
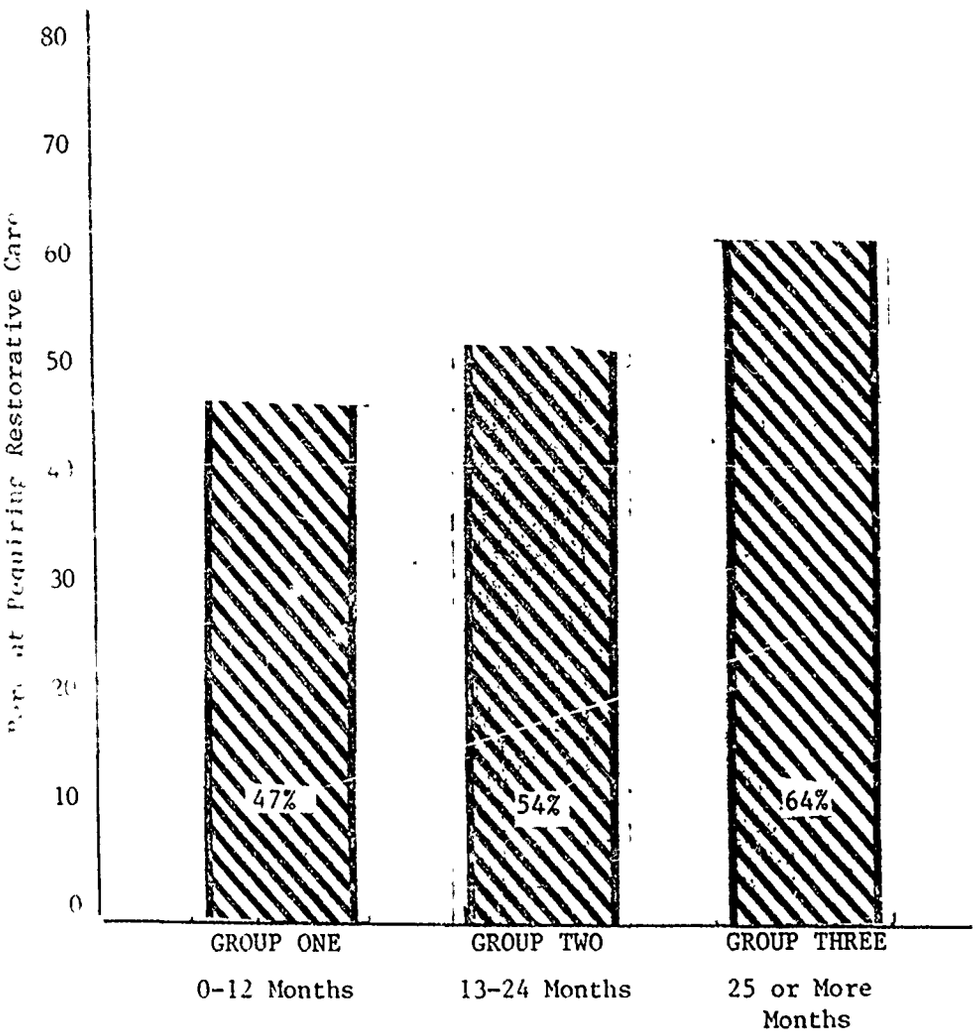


FIGURE 4

PERCENT OF THE POPULATION REQUIRING RESTORATIVE CARE AS A FUNCTION OF THE LENGTH OF TIME SINCE ALL DENTAL CARE WAS COMPLETED (INTERVAL GROUP).*



* Number of Persons Requiring Restorative Care by Interval Group: Pearson's χ^2 = .13, $p<.001$

FIGURE 5

PERCENT OF THE POPULATION REQUIRING REMOVABLE PROSTHODONTICS AS A FUNCTION OF THE LENGTH OF TIME SINCE ALL DENTAL CARE WAS COMPLETED

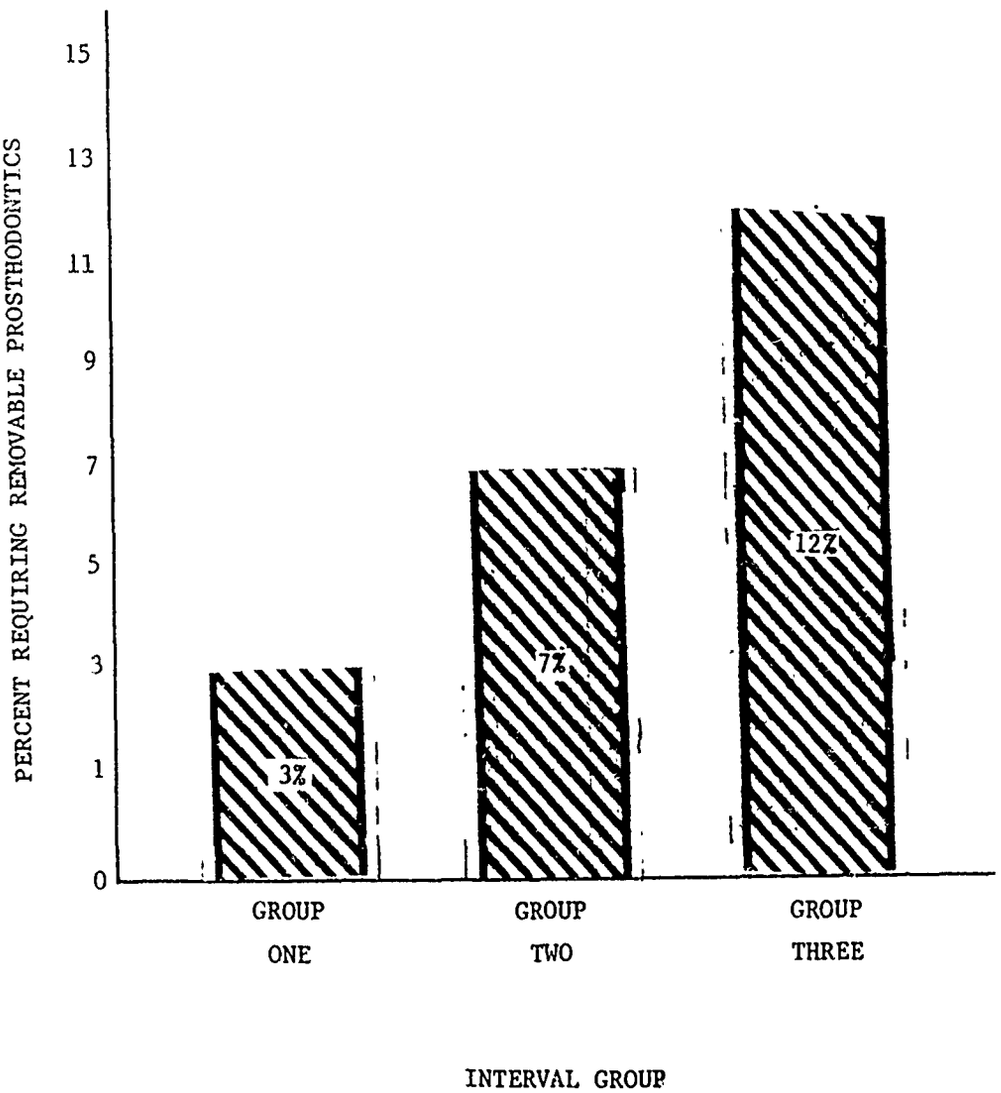


FIGURE 6

PERCENT OF THE POPULATION REQUIRING PERIODONTAL TREATMENT AS A FUNCTION OF THE LENGTH OF TIME SINCE ALL DENTAL CARE WAS COMPLETED

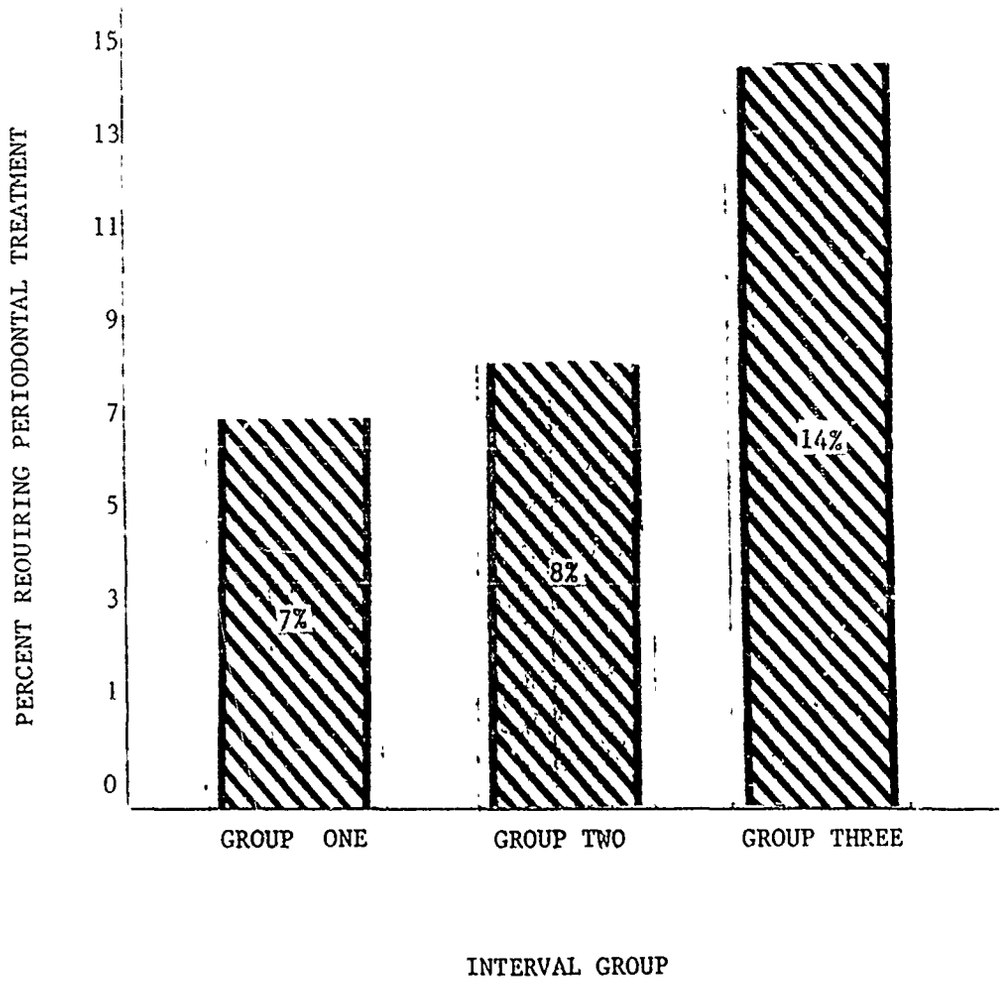
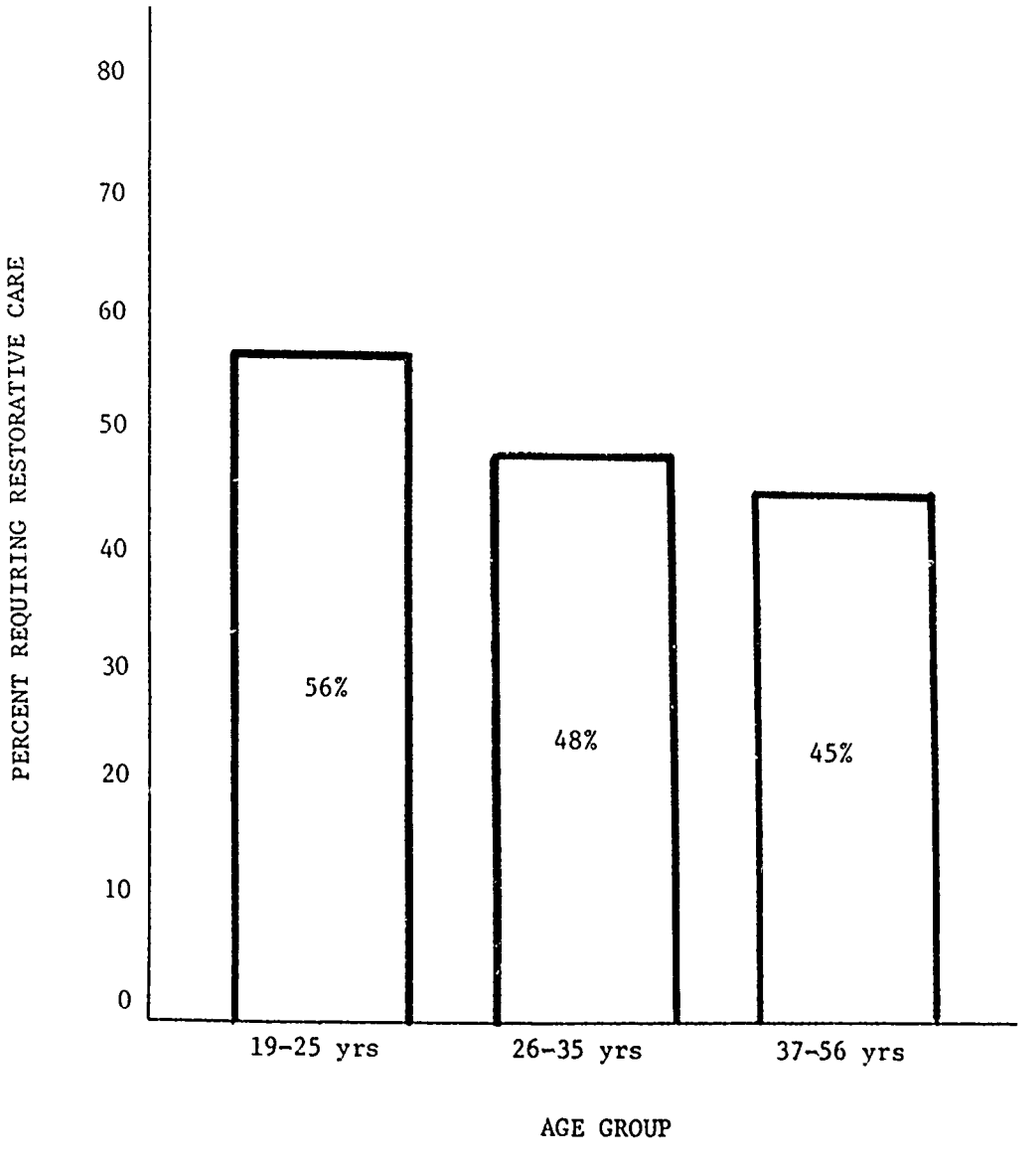


FIGURE 7

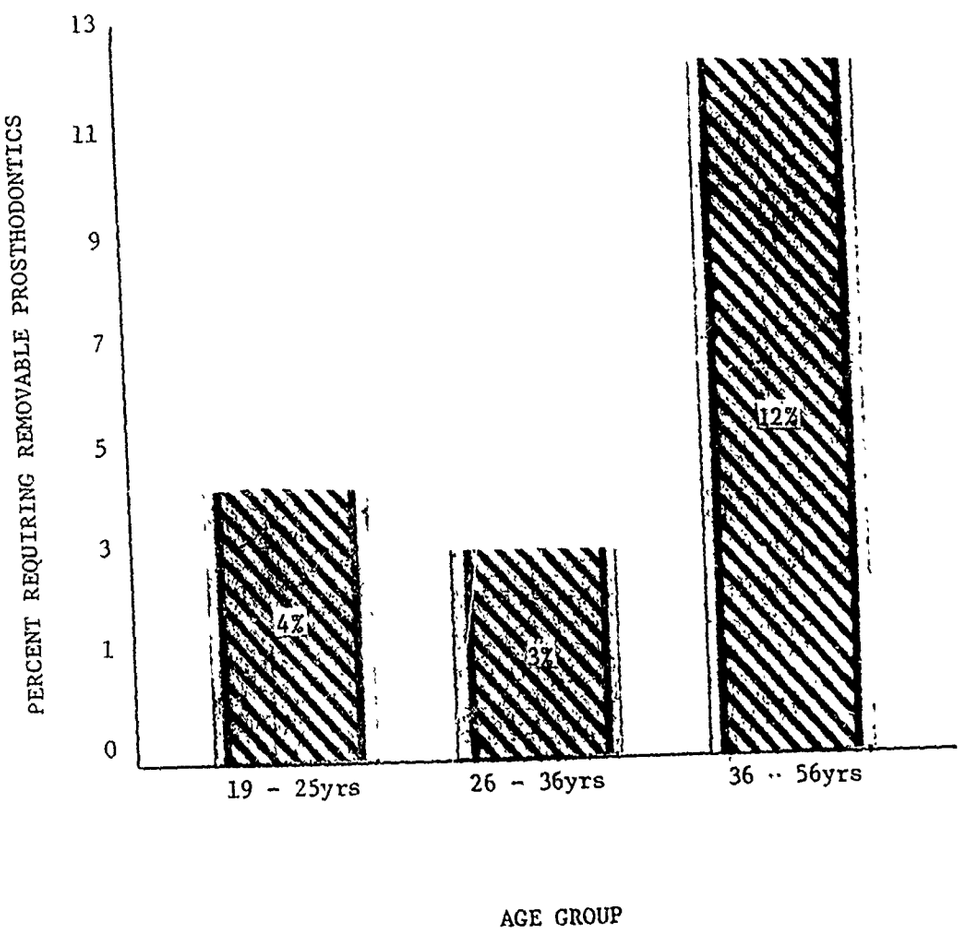
PERCENT OF THE POPULATION REQUIRING RESTORATIVE CARE BY AGE GROUP*



* Number of Teeth Requiring Restorative Care with Age of the Patient; Pearson's R = -.11, $p<.007$

FIGURE 8

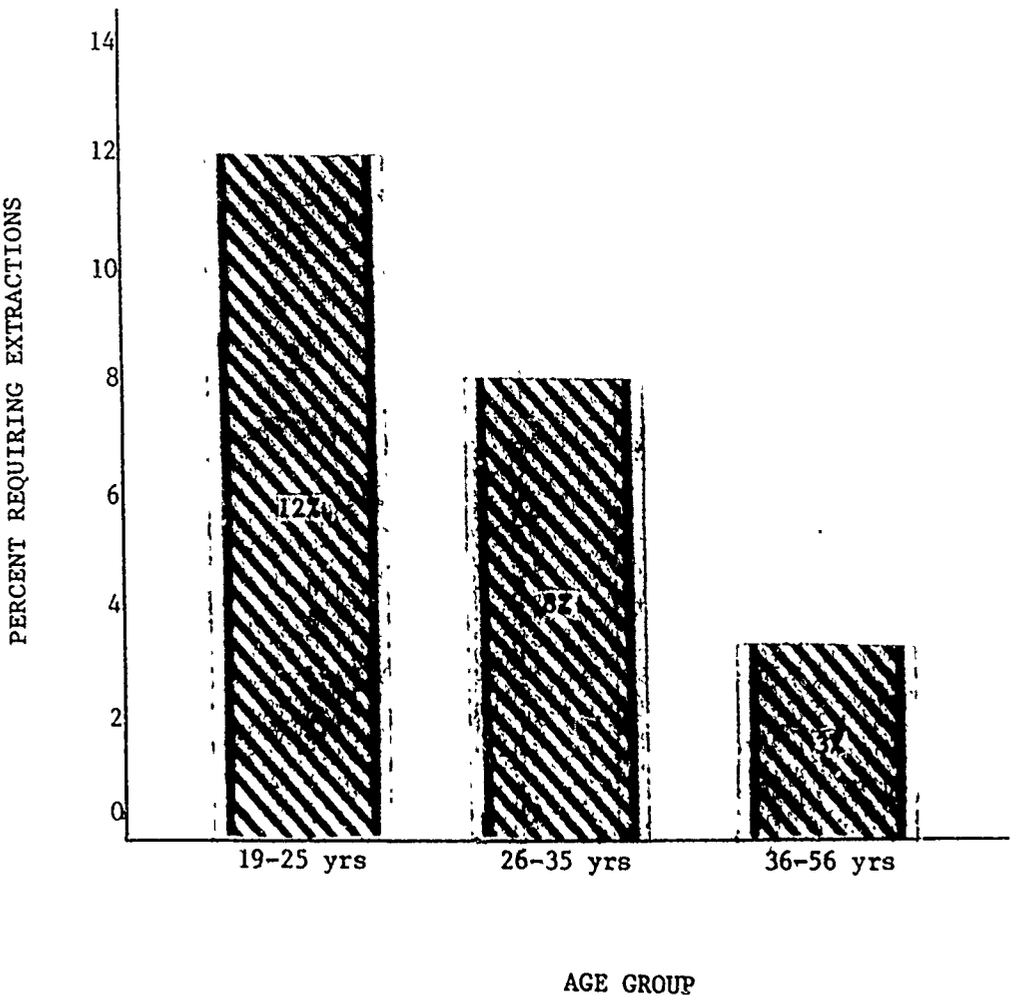
PERCENT OF THE POPULATION REQUIRING REMOVABLE PROSTHODONTICS BY AGE GROUP



Pearson's R = .08, p<.021

FIGURE 9

PERCENT OF THE POPULATION REQUIRING EXTRACTIONS
BY AGE GROUP



Pearson's R = -.12, p<.002

FIGURE 10

PERCENT OF THE POPULATION REQUIRING CALCULUS
REMOVAL BY AGE GROUP

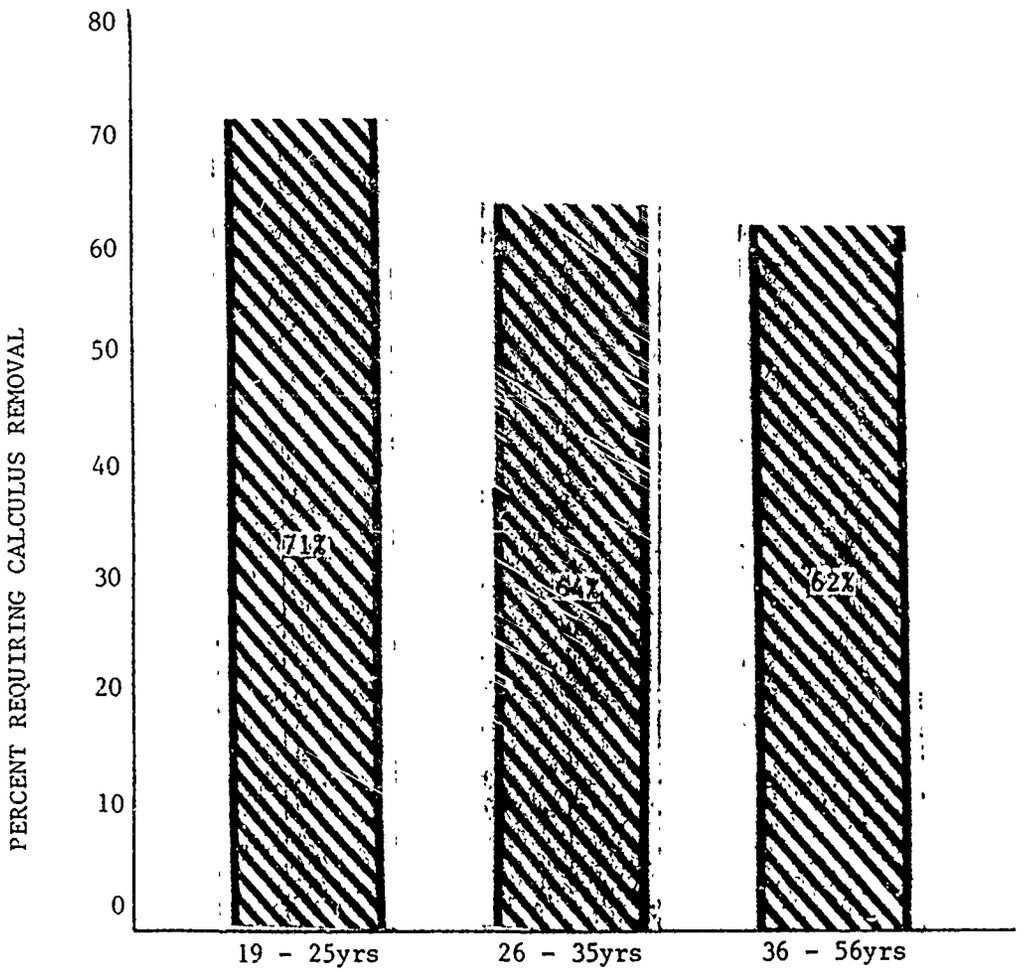
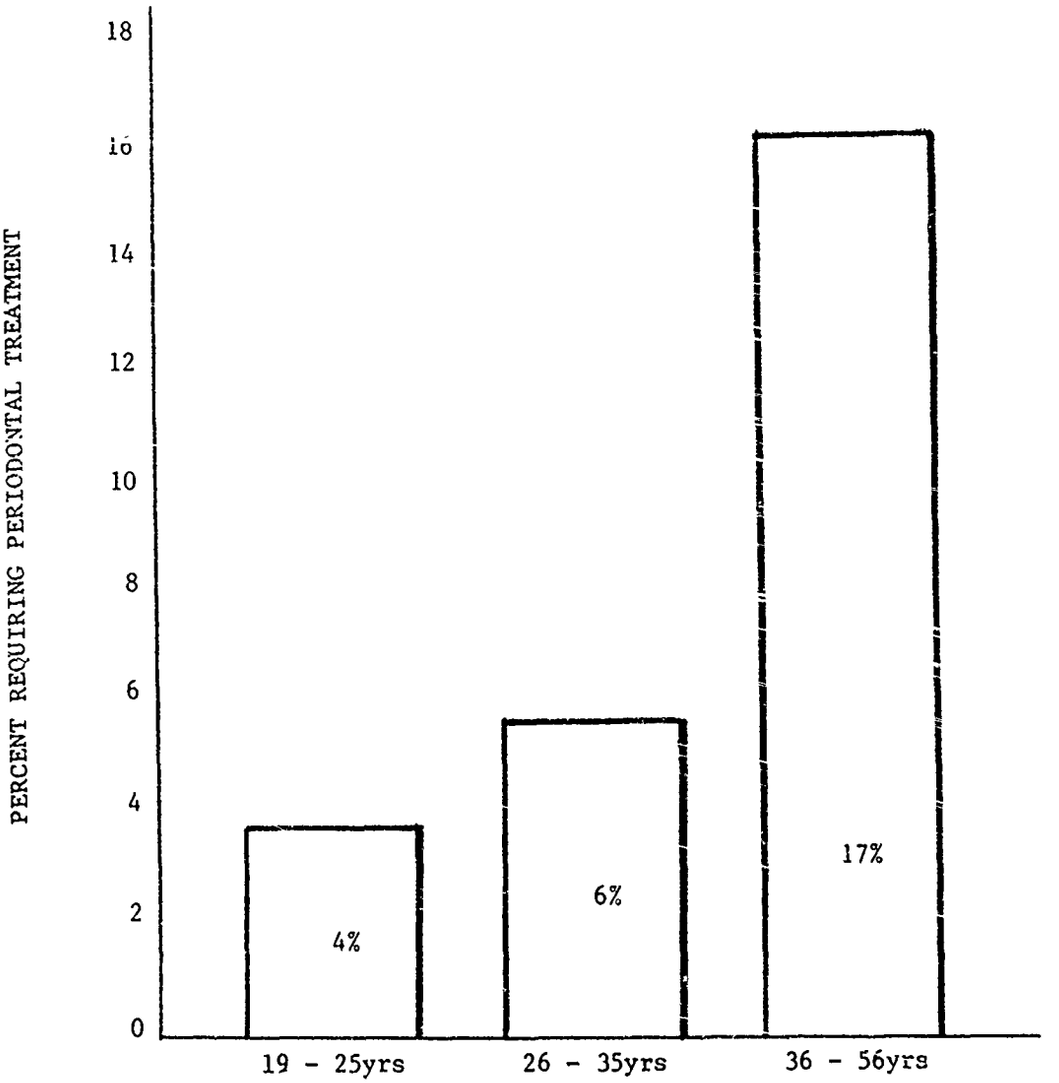


FIGURE 11

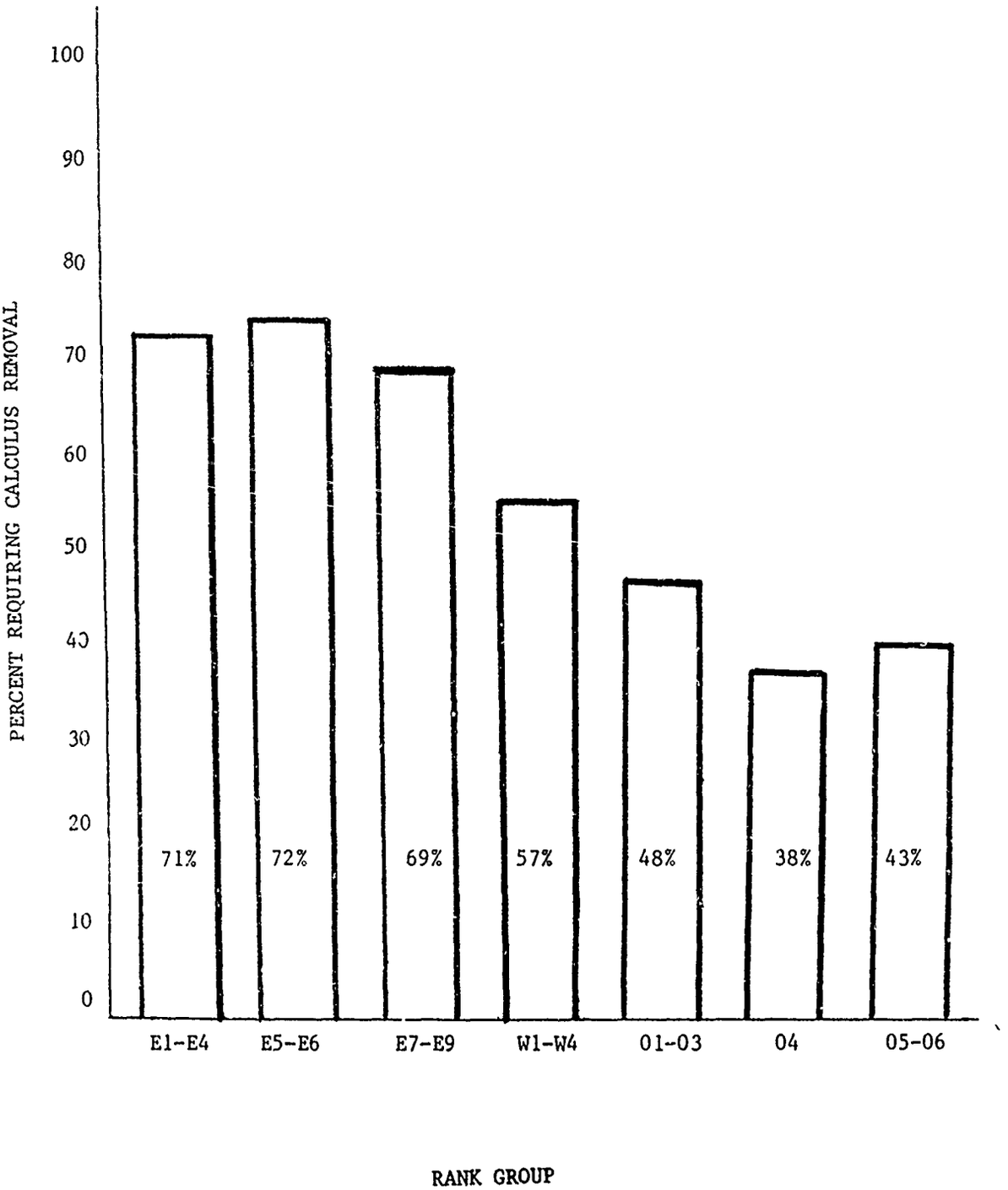
PERCENT OF THE POPULATION REQUIRING
PERIODONTAL TREATMENT BY AGE GROUP



Pearson's R = .16, p<.0001

FIGURE 12

PERCENT OF THE POPULATION REQUIRING
CALCULUS REMOVAL BY RANK GROUP



TABLES

TABLE 1

DISTRIBUTION OF THE SAMPLE BY RANK GROUP
AND INTERVAL GROUP

RANK GROUP	INTERVAL GROUP ONE	INTERVAL GROUP TWO	INTERVAL GROUP THREE	ROW TOTAL
E1-E4	134	46	14	194
E5-E6	72	60	29	161
E7-E9	39	13	10	62
W1-W4	8	5	1	14
O1-O3	44	14	4	62
O4	11	6	1	18
O5-O6	12	2	0	14
COLUMN TOTAL	320	146	59	525

$$X^2 (12) = 35.24, p<.001$$

TABLE 2

DISTRIBUTION OF SAMPLE BY AGE AND INTERVAL GROUP:
MEANS, STANDARD DEVIATIONS AND RESULTS OF
UNIVARIATE F TEST FOR AGE DIFFERENCES
BETWEEN INTERVAL GROUPS.

INTERVAL GROUP	MEAN	SD	N	F	SIG
GROUP ONE	29.49	7.73	317	-	
GROUP TWO	29.72	7.09	144	-	
GROUP THREE	30.69	6.54	59	-	
OVERALL	29.69	7.43	520	.65	NS*

* There was no preponderant age group in any interval group.

TABLE 3

PERCENT OF SAMPLE REQUIRING DENTAL CARE BY

INTERVAL GROUP

INTERVAL

TYPE OF CARE REQUIRED	GROUP ONE Percent Requiring Care	GROUP TWO Percent Requiring Care	GROUP THREE Percent Requiring Care
Restorative	47%	54%	64%
Fixed prosthodontics	6%	11%	5%
Removable prosthodontics	3%	7%	12%
Extractions	8%	10%	7%
Endodontics	2%	1%	3%
Dental prophylaxis	92%	91%	85%
Calculus removal	67%	66%	63%
Periodontal	7%	8%	14%

TABLE 4

REQUIREMENT FOR RESTORATIVE CARE BY INTERVAL GROUP

	INTERVAL GROUP			
	GROUP ONE	GROUP TWO	GROUP THREE	ROW TOTAL
Number Requiring Restorative Care	149	79	38	266
Number Requiring No Restorative Care	171	67	21	259
Column Total	320	146	59	525

Pearson's R = .13, $p<.001$

TABLE 5A

ANALYSIS OF VARIANCE FOR NUMBER OF REQUIRED RESTORATIONS BY INTERVAL GROUP

INTERVAL GROUP	MEAN	STANDARD DEVIATION	STANDARD ERROR	95% CI	F	SIG
					4.71	.009
GROUP ONE	1.31	2.18	.12	1.07 - 1.55	-	-
GROUP TWO	1.59	2.07	.17	1.25 - 1.93	-	-
GROUP THREE	2.31	3.41	.44	1.42 - 3.19	-	-

Pearson's R = .13, p<.001

TABLE 5B

STUDENT-NEWMAN-KEULS TEST FOR COMPARING PAIRS
OF GROUP MEANS FOR RESTORATIVE CARE

INTERVAL GROUP	1	2	3
Group One	0	0	-
Group Two	0	0	-
Group Three	+	+	0

Student-Newman-Keuls Procedure ($p<.05$)

\+ Significantly Greater

\- Significantly Lesser

0 No Significant Difference

TABLE 6

REQUIREMENT FOR FIXED PROSTHODONTICS BY INTERVAL GROUP

Number of Units Fixed Prosthodontics Required	INTERVAL GROUP (Number Requiring Care) Group One	Group Two	Group Three	Row Total
0	302	130	56	488
1	7	3	2	12
2	6	8	0	14
3	1	1	0	2
4	4	3	1	8
7	0	1	0	1
Column Total	320	146	59	525

$\underline{X}^2$ (10) = 11.01, NS

TABLE 7

REQUIREMENT FOR REMOVABLE PROSTHODONTICS
BY INTERVAL GROUP

Number of Units Removable Prosthodontics Required	INTERVAL GROUP (Number Requiring Care) Group One	Group Two	Group Three	Row Total
0	309	136	52	497
1	6	7	7	20
2	5	3	0	8
Column Total	320	146	59	525

$\underline{X}^2$ (4) = 15.16, p<.004

Pearson's R = .08, p<.033

TABLE 8

NUMBER OF TEETH REQUIRING EXTRACTION BY
INTERVAL GROUP

Number of Teeth Requiring Extraction	INTERVAL GROUP (NUMBER REQUIRING CARE) Group One	Group Two	Group Three	Row Total
0	295	132	55	482
1	12	9	3	24
2	9	2	1	12
3	3	1	0	4
4	1	1	0	2
5	0	1	0	1
Column Total	320	146	59	525

$\underline{X}^2$ (10) = 6.18 , NS

TABLE 9

NUMBER OF TEETH REQUIRING ENDODONTIC TREATMENT BY INTERVAL GROUP

Teeth Requiring Endodontic Treatment	INTERVAL GROUP (Number Requiring Care)			
	Group One	Group Two	Group Three	Row Total
0	313	144	57	514
1	6	2	1	9
2	1	0	1	2
Column Total	320	146	59	525

$\underline{X}^2$ (4) = 3.44 , NS

TABLE 10

DENTAL PROPHYLAXIS REQUIRED BY
INTERVAL GROUP

INTERVAL GROUP	CARE REQUIRED		
	No	Yes	Row Total
One	27	293	320
Two	13	132	145
Three	9	50	59
Column Total	49	475	524

$\underline{X}^2$ (2) = 2.77, NS

TABLE 11

CALCULUS REMOVAL REQUIRED BY
INTERVAL GROUP

INTERVAL GROUP	CARE REQUIRED		
	No	Yes	Row Total
One	106	214	320
Two	50	96	146
Three	22	37	59
Column Total	178	347	525

χ^2 (2) = .396, NS

TABLE 12

PERIODONTAL TREATMENT REQUIRED BY
INTERVAL GROUP

INTERVAL GROUP	CARE REQUIRED		
	No	Yes	Row Total
One	299	21	320
Two	135	11	146
Three	51	8	59
Column Total	485	40	525

χ^2 (2) = 3.47, NS

Pearson's R = .07, $p<.05$

TABLE 13

MEAN NUMBER OF RESTORATIONS REQUIRED
BY AGE GROUP (ANOVA)

AGE GROUP	MEAN	SD	(N)	(F)	SIG
19 to 25 yrs	1.77	2.81	189		
26 to 35 yrs	1.35	1.94	211		
36 to 56 yrs	1.27	2.03	120		
TOTAL	1.48	2.32	520	2.38	NS*

* $p < .05$

TABLE 14

REOUIREMENT FOR FIXED PROSTHODONTICS
BY AGE GROUP

Number of Units Fixed Prosthodontics Required	AGE GROUPS (NUMBER REQUIRING CARE)			
	19 - 25yrs	26 - 35 yrs	36 - 56yrs	Row Total
0	178	194	112	484
1	4	4	3	11
2	5	5	4	14
3	1	1	0	2
4	1	6	1	8
7	0	1	0	1
Column Total	189	211	120	520

$\underline{X}^2$ (10) = 6.50, NS

TABLE 15

REQUIREMENT FOR REMOVABLE PROSTHODONTICS
BY AGE GROUP

Number of Units Removable Prosthodontics Required	AGE GROUPS (NUMBER REQUIRING CARE)			Row
	19 - 25yrs	26 - 35yrs	36 -56 yrs	Total
0	181	204	107	492
1	6	4	10	20
2	2	3	3	8
Column Total	189	211	120	520

X^2 (4) = 10.11, $p<.038$

Pearson's R = .08, $p<.021$

TABLE 16

REQUIREMENT FOR EXTRACTIONS BY AGE GROUP

Number of Extractions Required	AGE GROUPS (NUMBER REQUIRING CARE) 19 -25yrs	26 - 35 yrs	36 -56yrs	Row Total
0	166	195	117	478
1	11	11	1	23
2	7	4	1	12
3	3	1	0	4
4	1	0	1	2
5	1	0	0	1
Column Total	189	211	120	520

$\underline{X}^2$ (10) = 14.37, NS

Pearson's R = -.12, $p<.002$

TABLE 17

NUMBER OF TEETH REQUIRING ENDODONTIC TREATMENTS BY AGE GROUPS

Number of Teeth Requiring Treatment	AGE GROUPS (NUMBER REQUIRING CARE)			
	19 - 25yrs	26 - 35yrs	36 - 56yrs	Row Total
0	187	205	117	509
1	1	5	3	9
2	1	1	0	2
Column Total	189	211	120	520

$\underline{X}^2$ (4) = 3.13, NS

TABLE 18

DENTAL PROPHYLAXIS REQUIRED BY AGE GROUP

Dental Prophylaxis Required	AGE GROUPS (NUMBER REQUIRING CARE)			
	19 - 25yrs	26 - 35yrs	36 - 56yrs	Row Total
Yes	173	189	108	470
No	16	22	11	49
Column Total	189	211	119	519

$\underline{X}^2$ (2) = .46, NS

TABLE 19

CALCULUS REMOVAL REQUIRED BY AGE GROUPS

Calculus Removal Required	Age Groups (Number Requiring Care)			Row Total
	19 - 25yrs	26 - 35yrs	36 - 56yrs	
YES	135	134	74	343
NO	54	77	46	177
COLUMN TOTAL	189	211	120	520

X^2 (2) = 4.07. NS

Pearson's R = -.08, p<.029

TABLE 20

PERIODONTAL TREATMENT REQUIRED BY

AGE GROUPS

Periodontal Treatment Required	Age Groups (Number Requiring Care) 19 - 25yrs	26 - 35yrs	36 - 56yrs	Row Total
YES	8	12	20	40
NO	181	199	100	480
COLUMN TOTAL	189	211	120	520

$\underline{X}^2$ (2) = 18.00, p<.0001

Pearson's R = .16, p< .0001

TABLE 21

NUMBER OF REQUIRED RESTORATIONS BY RANK GROUPS

RANK GROUP

(NUMBER REQUIRING CARE)

Restorations Required	E1-E4	E5-E6	E7-E9	W1-W4	01-03	04	05-06	Row Total
0	84	73	36	7	39	13	7	259
1	33	23	9	3	14	1	2	85
2	20	22	8	0	5	2	2	59
3	23	18	2	2	0	2	1	48
4	14	8	5	2	3	0	1	33
5	7	5	1	0	0	0	0	13
6	2	5	0	0	1	0	0	8
7	3	1	0	0	0	0	0	4
8	2	1	0	0	0	0	0	3
9	3	3	0	0	0	0	0	6
10	1	1	0	0	0	0	1	3
11	1	0	1	0	0	0	0	2
17	1	0	0	0	0	0	0	1
21	0	1	0	0	0	0	0	1
COLUMN TOTAL	194	161	62	14	62	18	14	525

$\underline{X}^2$ (78) = 64.17, NS

TABLE 22

REQUIREMENT FOR FIXED PROSTHODONTICS
BY RANK GROUPS

RANK GROUP (NUMBER REQUIRING CARE)	UNITS OF FIXED PROSTHODONTICS REQUIRED						
	0	1	2	3	4	7	Row Total
E1-E4	178	6	5	1	4	0	194
E5-E6	149	3	6	0	2	1	161
E7-E9	58	2	1	0	1	0	62
W1-W4	13	0	0	1	0	0	14
01-03	59	1	1	0	1	0	62
04	18	0	0	0	0	0	18
05-06	13	0	1	0	0	0	14
COLUMN TOTAL	488	12	14	2	8	1	525

$\underline{X}^2$ (30) = 26.89, NS

TABLE 23

REQUIREMENT FOR REMOVABLE PROSTHODONTICS
AMONG RANK GROUPS

RANK GROUP (NUMBER REQUIRING CARE)	NUMBER OF DENTURES REQUIRED 0	1	2	Row Total
E1 - E4	187	5	2	194
E5 - E6	146	10	5	161
E7 - E9	58	3	1	62
W1 - W4	13	1	0	14
O1 - O3	62	0	0	62
O4	17	1	0	18
O5 - O6	14	0	0	14
COLUMN TOTAL	497	20	8	525

$\underline{X}^2$ (12) = 12.00, NS

TABLE 24

EXTRACTIONS REQUIRED BY RANK GROUP

RANK GROUP (NUMBER REQUIRING EXTRACTIONS)	NUMBER OF EXTRACTIONS REQUIRED 0	1	2	3	4	5	Row Total
E1-E4	168	13	8	3	1	1	194
E5-E6	149	6	4	1	1	0	161
E7-E9	61	1	0	0	0	0	62
W1-W4	14	0	0	0	0	0	14
01-03	59	3	0	0	0	0	62
04	17	1	0	0	0	0	18
05-06	14	0	0	0	0	0	14
COLUMN TOTAL	482	24	12	4	2	1	525

$\underline{X}^2$ (30) = 18.24, NS

TABLE 25

NEED FOR ENDODONTIC TREATMENTS BY RANK GROUP

RANK GROUP (NUMBER REQUIRING CARE)	NUMBER OF TEETH REQUIRING ENDODONTIC CARE			
	0	1	2	Row Total
E1 - E4	191	2	1	194
E5 - E6	156	4	1	161
E7 - E9	60	2	0	62
W1 - W4	14	0	0	14
01 - 03	61	1	0	62
04	18	0	0	18
05 - 06	14	0	0	14
Column Total	514	9	2	525

$\underline{X}^2$ (12) = 3.74, NS

TABLE 26

REQUIREMENT FOR DENTAL PROPHYLAXIS
BY RANK GROUP

RANK GROUP (NUMBER REQUIRING CARE)	DENTAL PROPHYLAXIS REQUIRED YES	NO	Row Total
E1 - E4	177	17	194
E5 - E6	148	12	160
E7 - E9	58	4	62
W1 - W4	12	2	14
01 - 03	52	10	62
04	16	2	18
05 - 06	12	2	14
COLUMN TOTAL	475	49	524

$\underline{X}^2$ (6) = 5.57, NS

TABLE 27

REQUIREMENT FOR CALCULUS REMOVAL
BY RANK GROUP

RANK GROUP (NUMBER REQUIRING CARE)	CALCULUS REMOVAL REQUIRED YES	NO	Row Total
E1 - E4	137	57	194
E5 - E6	116	45	161
E7 - E9	43	19	62
W1 - W4	8	6	14
O1 - O3	30	32	62
O4	7	11	18
O5 - O6	6	8	14
COLUMN TOTAL	347	178	525

$\underline{X}^2$ (6) = 23.11, $p<.0008$

TABLE 28

REQUIREMENT FOR PERIODONTAL TREATMENT
BY RANK GROUP

RANK GROUP (NUMBER REQUIRING CARE)	PERIODONTAL TREATMENT REQUIRED YES	NO	Row Total
E1 - E4	11	183	194
E5 - E6	12	149	161
E7 - E9	8	54	62
W1 - W4	1	13	14
01 - 03	2	60	62
04	3	15	18
05 - 06	3	11	14
COLUMN TOTAL	40 (7.6%)	485 (92.4%)	525 (100%)

$\underline{X}^2$ (6) = 11.10, NS

APPENDIX A

Data Collection Instrument and Instructions

OFDEX STUDY

DENTAL CARE REQUIREMENTS DATA

(PLEASE READ INSTRUCTIONS ON THE REVERSE SIDE OF THIS FORM CAREFULLY)

SECTION I: *For installation use only*

A. Patient SSAN (Last 4) ___ ___ ___ ___

B. Installation UIC ☐ ☐ ☐ ☐ ☐ 1, 2, 3, 4, 5

C. Clinic Number ☐ ☐ 6, 7

D. Category "R" ☐ 8

SECTION II: *Each item MUST contain a numerical entry.*

1.	Age at nearest birthday.	☐ ☐	9, 10
2.	Rank (*See coding instructions*)	☐	11
3.	Sex (Male = 1, Female = 2)	☐	12
4.	Interval since last exam or treatment (*See coding instr.*)	☐ ☐	13, 14
5.	Number of required restorations: One Surface	☐ ☐	15, 16
	Two Surface	☐ ☐	17, 18
	Three + Surfaces	☐ ☐	19, 20
6.	Number of required Jackets/Crowns (Exclude Bridge Abutments)	☐ ☐	21, 22
7.	Number of required Fixed Bridge Abutments	☐ ☐	23, 24
8.	Number of complete Dentures required	☐	25
9.	Number of Removable Partial Dentures required	☐	26
10.	Number of Extractions required (Exclude asymptomatic third molars)	☐ ☐	27, 28
11.	Number of Anterior teeth requiring Endodontic treatments	☐ ☐	29, 30
12.	Number of Posterior teeth requiring Endodontic treatments	☐ ☐	31, 32
13.	Dental Prophylaxis required (No = 0, Yes = 1)	☐	33
14.	Calculus Removal required (No = 0, Yes = 1)	☐	34
15.	Periodontal treatment required (No = 0, Yes = 1, *See Instr.*)	☐	35
16.	Type of Radiographs required: Bite-wings	☐	36
	(No = 0, Yes = 1) Full mouth Periapicals	☐	37
	Panoramic	☐	38

OPTIMAL FREQUENCY FOR CONDUCTING PERIODIC DENTAL EXAMINATIONS (OFDEX)

INSTRUCTIONS FOR RECORDING DATA ON THE OFDEX FORM

Be sure that all of the boxes are filled in. LEAVE NO BLANKS. Enter "0" where no other number is required. EXAMPLE: If a patient requires two extractions, enter the numbers [0] [2].

SECTION I:

Line A. Enter the last four digits of the patient's Social Security Number. This information is for internal purposes only. It will not be recorded elsewhere or used in the analysis of the data.

Line B. This information should be pre-entered by the HCSD project officers. If blank, consult your clinic NCOIC.

Line C. Enter your clinic number. If not known, consult your clinic NCOIC.

Line D. To be completed by Project officers only.

SECTION II:

1. Age - Enter the patient's age at the nearest birthday anniversary.

   EXAMPLE: If the examination is done in October and the patient's birth month is January, enter the age that person will attain in that month.

2. Rank - In the boxes to the right enter the appropriate number using the following code:

		O1 - O3 = 5
E1 - E4 = 1	E7 - E9 = 3	O4 = 6
E5 - E6 = 2	W1 - W4 = 4	O5 - O6 = 7

3. Sex - Self-explanatory.

4. Interval since last exam or treatment: This information will be pre-coded by HSC Project Officers.

5. Number of required Restorations: If a one-surface carious lesion is present but will require a two-surface restoration, mark the data sheet to reflect a <u>two-surface</u> restoration.

6. Items 6, 7, 8, and 9 should also include jackets, crowns, and complete or partial dentures which need replacement.

7. Number of Extractions required: Exclude asymptomatic third molars, whether erupted or unerupted, functional or non-functional.

8. Items 11 and 12 regarding endodontic treatment should reflect only those teeth that you feel could be realistically treated. Availability of resources to provide endodontic treatment should not be a factor in your consideration. Indicate "Yes" if you feel the patient requires definitive periodontal treatment beyond prophylaxis or scaling. If you would refer the patient only for a consult, indicate "No".

9. Item 15, Periodontal treatment required: If prophylaxis and/or calculus removal is required in conjunction with definitive periodontal treatment, mark items 13 and 14 accordingly.

DISTRIBUTION:

HQDA (DASG) (1)

HSDS HSC (1)

HSOP-S HSC (1)